

**Physitron, Inc.**

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phone: (256) 534-4844 - fax: (256) 534-4846 - url: [www.physitron.com](http://www.physitron.com)**POLYMER & NANOCOMPOSITE TECHNOLOGIES*****Nanocomposites***

Physitron is developing methods to enhance the material properties of polymer materials through the use of nanocomposite technology. A nanocomposite is the combination of two or more materials on a microscopic scale to form a new composite material that possesses the combined properties of the constituent materials. This process is analogous to conventional composites, in that it is the addition of inorganic materials in a polymer binder/matrix that provides the property enhancement over conventional polymers. However, the technology differs from competing techniques that rely on the simple addition of powders to a liquid polymer. Physitron uses a special surface treatment technique on the nanoparticulate materials that results in chemical bonds between the additive and the polymer molecule. This results in increased wetting of the additive by the polymer resin and a more uniform distribution throughout the polymer matrix.

These processes are compatible with virtually any binder/filler material combination. Physitron is using this technology to produce polymers having enhanced properties in many forms:

- **Tear Resistant Polymer Films** – Thin polymer films, ranging in thickness from 0.1-2 mils, are useful in many applications. Unfortunately, they tear easily. Physitron is developing film materials that contain graphite nanofibers (GNFs) to resist tearing. These films are useful in many applications including those where an optically smooth membrane is desired.
- **Low CTE Polymers** – Polymer materials have an inherently high Coefficient of Thermal Expansion (CTE). This makes them undesirable for use in applications where true thermal stability is important. Physitron is formulating proprietary material combinations that result in polymer resins having an ultra-low CTE.
- **Electrically Conductive Polymers** – Most polymers are used in situations where their high dielectric properties are desirable. However, some applications require that the polymer be electrically conductive. Physitron is developing methods to produce conductive polymers that exhibit high levels of bulk electrical conductivity.
- **Radiation Shielding Polymers** – Electronic circuit cards are sometimes used in applications where they are susceptible to

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Electro Magnetic Interference (EMI) radiation. In these applications, it is desirable to shield these electronics without using bulky components. Physitron is developing techniques to impart EMI shielding properties to conventional conformal coating materials.

The above materials may be produced in many forms. Physitron is currently developing methods to produce these materials as films, coatings, and cast parts. Future development will result in polymer films that are cast to shape or produced in continuous rolls. The materials are also being considered for use in conventional composites where the resin component is capable of providing strength properties, thermal stability, and/or electrical conductivity.

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